

### **REMARKS**

The Examiner is thanked for the thorough examination of the application. No new matter is believed to be added to the application by this Amendment.

### **Status Of The Claims**

Claims 1-3, 5, and 7-21 are pending in this application. Claims 4 and 6 have been cancelled and their subject matter has been incorporated into claim 1. Claims 7-9 have been amended to not depend on a cancelled claim. The claims have also been amended to improve their language. Claims 14 and 15 find support at page 11, lines 17-20 of the specification. Claims 16-18 find support at page 12, lines 10-11 of the specification. Claims 19-21 find support at page 12, lines 18-25 of the specification.

### **Rejection under 35 U.S.C. § 112 (page 2 of the Office Action)**

The Examiner rejects the claims under 35 U.S.C. §112 as being indefinite.

In the Office Action, the Examiner asserts that the term "high-speed" in claim 1 is a relative term that is not defined. Although the Applicants do not accede to the Examiner's position, the claims have been amended to remove this limitation in order to expedite prosecution. The claims are thus clear, definite and have full antecedent basis.

This rejection is overcome and withdrawal thereof is respectfully requested.

**Rejection under 35 U.S.C. §103(a) over Suzuki in view of Schlager or Tatsuaki  
(pages 2-4 of the Office Action)**

Claims 1-13 are rejected under 35 U.S.C. § 103(a) as being obvious over Suzuki (USP 5,296,111) in view of Schlager (USP 6,780,306) or Tatsuaki (JP 8281272). Applicants traverse.

**The Present Invention And Its Advantages**

The present invention pertains to a wastewater treating method that is highly suitable for the decomposition treatment of wastewater containing aminocarboxylic acid. The process of the present invention includes an optimal range of vibration frequencies for selective electrolysis.

Also, since plating wastewater containing a metal is also wastewater containing aminocarboxylic acid, the method of the present invention can treat the metal-containing plating wastewater with high-efficiency by performing an electrolytic oxidation treatment accompanied by vibration, followed by treatment with a microorganism. The unexpectedly effective results of the present invention are demonstrated in Examples 2-4 of the specification.

The present invention has many embodiments, and a typical embodiment can be found in claim 1:

1. A method for treating an organic wastewater containing an aminopolycarboxylic acid, which comprises:
  - subjecting the organic wastewater to an electrolytic oxidation treatment by vibrating the organic waste water at a frequency of 10 cycles/sec to 100 cycles/sec; and
  - treating the organic wastewater with a microorganism.

*Distinctions Of The Invention Over Suzuki, Schlager And Tatsuaki*

Suzuki pertains to a method of treating photographic processing wastes. Typically, claim 1 of Suzuki uses bio-oxidation to treat photographic processing wastes. Suzuki, at column 11, lines 24-32, describes conventional agitation methods including bubbling gas into a bath, agitating the bath with a revolving plate or rod and pumping.

Suzuki fails to disclose high-speed treatment using a vibrating plate. The Examiner admits to this failure of Suzuki at page 3, lines 15-16, of the Office Action.

It can be readily understood that the agitation of the electrolysis of Suzuki is a conventional physical circulation agitation. The agitation of Suzuki is different from and is more inefficient than the vibration used in the present invention. Accordingly, one cannot expect the excellent results of the present invention by using the technology of Suzuki.

Nonetheless, the Examiner then turns to Schlager or Tatsuaki to address the deficiencies of Suzuki.

Figure 1 of Schlager shows an ultra-sonic generator 28 connected to space electrodes 2 and 3 that are placed on a water pipeline 4 of a wastewater treatment apparatus. Schlager at column 8, lines 39-43, discusses that agitation by ultrasound is by cavitation.

However, ultrasound generally has a frequency of 20,000 Hz or more (20,000 cycles per second or more), which is fundamentally different than the frequency used in the present invention (10 to 100 cycles per second, as is set forth in claim 1). In addition, in the ultrasound range, a property (cavitation) that is not present at low frequency occurs, and Schlager makes use of this effect that is peculiar to ultrasound. The technology of Schlager thus does not pertain to the present invention.

Tatsuaki pertains to the treatment of waste electroless plating water. The abstract of Tatsuaki discusses vibration vane plates 5 attached to a vane-fixing member 10. A vibration motor 1 is capable of generating vibrations between 10 and 500 Hz. However, Tatsuaki pertains to a treatment apparatus for plating wastewater containing a metal, but there is no disclosure of aminopolycarboxylic acid treatment in Tatsuaki. Although paragraph **0007** of Tatsuaki describes that a plating wastewater has a COD (chemical oxygen demand) of several thousand to 20,000, the TOC (total organic carbon) of the plating wastewater is several hundred, and the plating wastewater is not a wastewater mainly containing organic matter such as aminopolycarboxylic acid.

It is also taught in paragraph **0005** of Tatsuaki that the metal in the plating wastewater is contained in ionic form, and it is thus impossible to adopt a biological treatment of the plating wastewater. Tatsuaki is therefore fundamentally different from the present invention, which pertains to a method for treating metal-containing and aminopolycarboxylic acid-containing wastewater by electrolysis, followed by treatment with a microorganism.

Therefore, one of ordinary skill in the art would not be motivated by the combination of Suzuki with Schlager or Tatsuaki to produce the present invention as embodied in claim 1. A *prima facie* case of obviousness has not been made. Claims depending upon claim 1 are patentable for at least the above reasons.

Further, even if one assumes *arguendo* that the combination of Suzuki with Schlager or Tatsuaki is sufficient to allege obviousness, this obviousness would be rebutted by the unexpected results of the present invention. These unexpected results are typified by Examples 2-4 of the specification.

In Example 2, an electrolytically treated wastewater was subsequently treated with *Bacillus editabidus*-1. The results of the treatment are shown in Table 2 at page 37 of the specification, which is reproduced below.

Table 2

Electrolysis Time (hr)	COD	EDTA	COD after biological	EDTA after biological
0	20000	620	17000	180
1	17500	540	15000	110
2	16000	380	1800	0
4	9000	0	600	0
6	5000	0	400	0
8	4000	0	100	0
10	3000	0	60	0

Units: COD in ppm, EDTA in mg/L

In Example 3, the microorganism was supported on a carrier (see claim 9). The results of the treatment are shown in Table 3 at page 38 of the specification, which is reproduced below.

Table 3

Electrolysis Time (hr)	COD	EDTA	COD after biological treatment	EDTA after biological treatment
0	20000	620	15500	150
1	17500	540	13500	80
2	16000	380	1500	0
4	9000	0	480	0
6	5000	0	150	0
8	4000	0	80	0
10	3000	0	70	0

In Example 4, the same methodology as Example 3 was used, except that the bacterial strain was *Pseudomonas editabidus*-1. The results of the treatment are shown in Table 4 at page 40 of the specification, which is reproduced below.

Table 4

Duration of electrolysis	pH 6.0		pH 6.5		pH 11.0		pH 11.5	
	COD	EDTA	COD	EDTA	COD	EDTA	COD	EDTA
0	2000	620	2000	620	2000	620	2000	620
1	19400	600	18300	580	18100	570	19100	590
2	18500	590	17900	420	17600	400	18200	510
4	16900	510	11800	20	11000	10	16600	490
6	15700	430	6000	0	5900	0	15400	380
8	14800	370	4600	0	4500	0	14300	330
10	13600	300	3400	0	3300	0	13200	280

Unit: hours for duration of electrolysis; mg/L for COD and EDTA

As a result, there are clear and unexpected advantages when using the process of the present invention where electrolysis at low frequency vibration (10 to 100 cycles per second) is followed by bacterial treatment.

This rejection is overcome and withdrawal thereof is respectfully requested.

**Information Disclosure Statement**

The Examiner is thanked for considering the Information Disclosure Statement filed August 20, 2003 and for making the initialed PTO-1449 form of record in the application in the Office Action mailed October 6, 2006.

**Foreign Priority**

The Examiner has acknowledged foreign priority in the Office Action mailed October 6, 2006.

**Conclusion**

The Examiner's rejections have been overcome, obviated or rendered moot. No issues remain. The Examiner is accordingly respectfully requested to place the application in condition for allowance and to issue a Notice of Allowability

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Robert E. Goozner, Ph.D. (Reg. No. 42,593) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.14; particularly, extension of time fees.

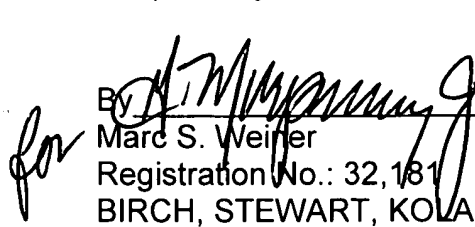
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